

# **FOLDABLE BICYCLE**

## **BACKGROUND OF THE INVENTION**

### **1. Field of the Invention**

The present invention relates to a foldable bicycle, and more particularly to a foldable bicycle whose front wheel and rear wheel are arranged in a parallel manner when the foldable bicycle is folded, so that the user can drive the folded bicycle to move forward easily and conveniently.

### **2. Description of the Related Art**

A conventional foldable bicycle comprises a front frame having a front wheel, a rear frame having a rear wheel, and a folding device mounted between the front frame and the rear frame. In folding of the conventional foldable bicycle, the folding device functions as a pivot, so that the rear frame is pivoted relative to the front frame until the rear frame is rested on a side of the front frame, thereby folding the bicycle.

However, when the conventional foldable bicycle is folded, the front wheel and the rear wheel are directed toward different directions, so that the user cannot drive the folded bicycle to move forward and has to lift the folded bicycle for moving the folded bicycle, thereby causing inconvenience to the user and thereby consuming the user's energy.

## **SUMMARY OF THE INVENTION**

The present invention is to mitigate and/or obviate the disadvantage of the conventional foldable bicycle.

The primary objective of the present invention is to provide a foldable bicycle whose front wheel and rear wheel are juxtaposed to each other in a parallel manner when the foldable bicycle is folded, so that the user can drive the folded bicycle to move forward easily and conveniently.

Another objective of the present invention is to provide a foldable bicycle whose volume is greatly reduced when the foldable bicycle is folded, thereby facilitating storage and transportation of the folded bicycle.

A further objective of the present invention is to provide a foldable bicycle, wherein when the foldable bicycle is folded, the rear wheel is in parallel with the front wheel, so that the user can simultaneously draw the rear wheel and the front wheel to move easily and conveniently, thereby facilitating the user moving the folded bicycle.

A further objective of the present invention is to provide a foldable bicycle, wherein the foldable bicycle is folded easily and conveniently, thereby facilitating the user folding the bicycle.

In accordance with the present invention, there is provided a foldable bicycle, comprising:

1           a front fork including a shaft tube, and a tubular holding arm  
2   rotatably mounted on the shaft tube, the shaft tube having a mediate portion  
3   rotatably mounted in the head tube, and a bent lower end protruded outward  
4   from the head tube and formed with an insertion section rotatably mounted on  
5   an upper end of the holding arm;

6           a head tube having a periphery provided with a connecting rod;

7           a support tube having a first end pivotally mounted on a distal end of  
8   the connecting rod and a second end having a periphery formed with a  
9   protruding first positioning block;

10          an adjusting member having a first end movably and rotatably  
11   mounted on the second end of the support tube and a second end provided with  
12   a seat post connected to a seat;

13          a rear fork having a first end having a periphery formed with a  
14   protruding second positioning block;

15          two support levers mounted between the second end of the support  
16   tube and the first end of the rear fork to connect the support tube and the rear  
17   fork, each of the two support levers having a first end pivotally mounted on a  
18   side of the first positioning block of the support tube and a second end  
19   pivotally mounted on a side of the second positioning block of the rear fork;

20          a first locking member pivotally mounted between the two support  
21   levers and engaged with the first positioning block of the support tube;

1 a first pressing member pivotally mounted between the two support  
2 levers and rested on the first locking member;

3 a second locking member pivotally mounted between the two  
4 support levers and engaged with the second positioning block of the rear fork;  
5 and

6 a second pressing member pivotally mounted between the two  
7 support levers and rested on the second locking member.

8 Further benefits and advantages of the present invention will become  
9 apparent after a careful reading of the detailed description with appropriate  
10 reference to the accompanying drawings.

### 11 **BRIEF DESCRIPTION OF THE DRAWINGS**

12 FIG. 1 is a side plan view of a foldable bicycle in accordance with the  
13 preferred embodiment of the present invention;

14 FIG. 2 is a partially perspective view of the foldable bicycle in  
15 accordance with the preferred embodiment of the present invention;

16 FIG. 3 is a partially exploded perspective view of the foldable bicycle  
17 in accordance with the preferred embodiment of the present invention;

18 FIG. 4 is a side plan assembly view of the foldable bicycle as shown  
19 in FIG. 3;

20 FIG. 5 is a partially enlarged view of the foldable bicycle as shown in  
21 FIG. 4;

FIG. 6 is a partially enlarged view of the foldable bicycle as shown in FIG. 4;

FIG. 7 is a side plan view of the foldable bicycle in accordance with the preferred embodiment of the present invention;

FIG. 8 is a schematic operational view of the foldable bicycle as shown in FIG. 7;

FIG. 9 is a schematic operational view of the foldable bicycle as shown in FIG. 8;

FIG. 10 is a schematic operational view of the foldable bicycle as shown in FIG. 9;

FIG. 11 is a schematic operational view of the foldable bicycle as shown in FIG. 10;

FIG. 12 is a schematic operational view of the foldable bicycle as shown in FIG. 11; and

FIG. 13 is a schematic operational view of the foldable bicycle as shown in FIG. 11.

### **DETAILED DESCRIPTION OF THE INVENTION**

Referring to the drawings and initially to FIGS. 1-3, a foldable bicycle in accordance with the preferred embodiment of the present invention comprises a front fork 10, a head tube 20, a support tube 30, an adjusting member 40, two support levers 50, a rear fork 60, and a hydraulic cylinder 70.

1           The front fork 10 is a single-arm body and includes a shaft tube 12,  
2   and a tubular holding arm 14 rotatably mounted on the shaft tube 12. The shaft  
3   tube 12 has a mediate portion rotatably mounted in the head tube 20, an upper  
4   end protruded outward from the head tube 20 and connected to a handlebar 122,  
5   and a bent lower end protruded outward from the head tube 20 and formed with  
6   an insertion section 124 rotatably mounted on an upper end of the holding arm  
7   14. A front wheel 80 is rotatably mounted on a lower end of the holding arm 14.  
8   Preferably, the insertion section 124 of the shaft tube 12 is rotatably mounted  
9   on the upper end of the holding arm 14 by a plurality of spring-biased  
10   positioning pins 16.

11           The head tube 20 has a periphery provided with a connecting rod 22.  
12   The connecting rod 22 has a distal end having a periphery provided with a  
13   pivot portion 24.

14           The support tube 30 has a first end pivotally mounted on the distal  
15   end of the connecting rod 22. The first end of the support tube 30 is formed  
16   with a bifurcated pivot portion 32 pivotally mounted on the pivot portion 24 of  
17   the connecting rod 22 by a pivot pin 33.

18           The adjusting member 40 has a first end movably and rotatably  
19   mounted on a second end of the support tube 30 and a second end provided  
20   with a seat post 42 connected to a seat 44. The first end of the adjusting  
21   member 40 is locked on the second end of the support tube 30 by a locking

1 device 34. Thus, the adjusting member 40 is movable relative to the support  
2 tube 30 to adjust the distance between the seat 44 and the handlebar 122.

3 The two support levers 50 are mounted between the second end of  
4 the support tube 30 and a first end of the rear fork 60 to connect the support  
5 tube 30 and the rear fork 60. A rear wheel 90 is rotatably mounted on a second  
6 end of the rear fork 60.

7 Referring to FIGS. 1-6, the second end of the support tube 30 has a  
8 periphery formed with a protruding first positioning block 36, and the first end  
9 of the rear fork 60 has a periphery formed with a protruding second positioning  
10 block 64. Each of the two support levers 50 has a first end pivotally mounted  
11 on a side of the first positioning block 36 of the support tube 30 and a second  
12 end pivotally mounted on a side of the second positioning block 64 of the rear  
13 fork 60.

14 The hydraulic cylinder 70 is mounted between the two support levers  
15 50 and has a first end pivotally mounted on the support tube 30 and a second  
16 end pivotally mounted on the rear fork 60. The hydraulic cylinder 70 includes a  
17 mounting tube 74 having a first end pivotally mounted on the second  
18 positioning block 64 of the rear fork 60, and a shaft 72 having a first end  
19 pivotally mounted on the first positioning block 36 of the support tube 30 and a  
20 second end movably mounted in a second end of the mounting tube 74. Thus,  
21 the hydraulic cylinder 70 applies a push action to the support tube 30 and the  
22 rear fork 60.

1           A first locking member 51 is pivotally mounted between the two  
2 support levers 50 and engaged with the first positioning block 36 of the support  
3 tube 30, and a first pressing member 52 is pivotally mounted between the two  
4 support levers 50 and rested on the first locking member 51. The first  
5 positioning block 36 of the support tube 30 is formed with an arcuate first  
6 snapping recess 362. The first locking member 51 has a first end pivotally  
7 mounted between the two support levers 50 by a first pivot shaft 512 and a  
8 second end formed with an arc-shaped first snapping portion 514 snapped into  
9 the first snapping recess 362 of the first positioning block 36, so that the  
10 support tube 30 is locked between the two support levers 50 by the first locking  
11 member 51. The first pressing member 52 has a circular first end 522 having a  
12 periphery rested on a periphery of the first snapping portion 514 of the first  
13 locking member 51 and a second end formed with a handle 524. The first end  
14 522 of the first pressing member 52 is pivotally mounted between the two  
15 support levers 50 by a first pivot axle 526. The first pivot axle 526 is  
16 eccentrically located on the first end 522 of the first pressing member 52.

17           A second locking member 53 is pivotally mounted between the two  
18 support levers 50 and engaged with the second positioning block 64 of the rear  
19 fork 60, and a second pressing member 54 is pivotally mounted between the  
20 two support levers 50 and rested on the second locking member 53. The second  
21 positioning block 64 of the rear fork 60 is formed with an arcuate second  
22 snapping recess 642. The second locking member 53 has a first end pivotally



1 mounted between the two support levers 50 by a second pivot shaft 532 and a  
2 second end formed with an arc-shaped second snapping portion 534 snapped  
3 into the second snapping recess 642 of the second positioning block 64, so that  
4 the rear fork 60 is locked between the two support levers 50 by the second  
5 locking member 53. The second pressing member 54 has a circular first end  
6 542 having a periphery rested on a periphery of the second snapping portion  
7 534 of the second locking member 53 and a second end formed with a handle  
8 544. The first end 542 of the second pressing member 54 is pivotally mounted  
9 between the two support levers 50 by a second pivot axle 546. The second  
10 pivot axle 546 is eccentrically located on the first end 542 of the second  
11 pressing member 54.

12 In practice, the front wheel 80 is located at a side of the holding arm  
13 14 and located under the head tube 20, and the rear wheel 90 is mounted on the  
14 second end of the rear fork 60. In addition, the first end 522 of the first pressing  
15 member 52 is rested on the periphery of the first snapping portion 514 of the  
16 first locking member 51, so that the first snapping portion 514 of the first  
17 locking member 51 is locked in the first snapping recess 362 of the first  
18 positioning block 36. Thus, the support tube 30 is locked between the two  
19 support levers 50 by the first locking member 51. Similarly, the first end 542 of  
20 the second pressing member 54 is rested on the periphery of the second  
21 snapping portion 534 of the second locking member 53, so that the second  
22 snapping portion 534 of the second locking member 53 is locked in the second

1 snapping recess 642 of the second positioning block 64. Thus, the rear fork 60  
2 is locked between the two support levers 50 by the second locking member 53.

3 In operation, the locking device 34 is loosened, so that the adjusting  
4 member 40 is movable relative to the support tube 30. Then, the adjusting  
5 member 40 is moved to fully retract into the support tube 30 and is rotated  
6 through 90 degrees, so that the seat 44 is moved from the position as shown in  
7 FIG. 7 to the position as shown in FIG. 8. In such a manner, the seat 44 is  
8 juxtaposed to the support tube 30, so that a space is formed behind the second  
9 end of the support tube 30 and the adjusting member 40.

10 Subsequently, the handle 544 of the second pressing member 54 is  
11 driven, so that the first end 542 of the second pressing member 54 is rotated  
12 about the second pivot axle 546 eccentrically, thereby releasing the second  
13 locking member 53 from the second pressing member 54, so that the second  
14 snapping portion 534 of the second locking member 53 is detached from the  
15 second snapping recess 642 of the second positioning block 64. Thus, the rear  
16 fork 60 is detached from the two support levers 50 by releasing the second  
17 locking member 53, so that the rear fork 60 can be pivoted relative to the two  
18 support levers 50.

19 Then, the rear fork 60 is pivoted upward relative to the two support  
20 levers 50 to move from the position as shown in FIG. 8 to the position as shown  
21 in FIG. 9, so that the rear wheel 90 is folded in the space formed behind the

1 adjusting member 40. At this time, the hydraulic cylinder 70 is compressed by  
2 pivot of the rear fork 60.

3 Subsequently, the handle 524 of the first pressing member 52 is  
4 driven, so that the first end 522 of the first pressing member 52 is rotated about  
5 the first pivot axle 526 eccentrically, thereby releasing the first locking  
6 member 51 from the first pressing member 52, so that the first snapping  
7 portion 514 of the first locking member 51 is detached from the first snapping  
8 recess 362 of the first positioning block 36. Thus, the support tube 30 is  
9 detached from the two support levers 50 by releasing the first locking member  
10 51, so that the two support levers 50 can be pivoted relative to the support tube  
11 30.

12 Then, the two support levers 50 are pivoted upward relative to the  
13 support tube 30 to move from the position as shown in FIG. 9 to the position as  
14 shown in FIG. 10, so that the two support levers 50 and the hydraulic cylinder  
15 70 are folded in the space under the support tube 30. At this time, the hydraulic  
16 cylinder 70 is fully compressed by pivot of the two support levers 50.

17 Subsequently, the spring-biased positioning pins 16 are pressed to  
18 detach the shaft tube 12 from the holding arm 14, so that the holding arm 14  
19 can be rotated relative to the shaft tube 12.

20 Then, the holding arm 14 is rotated relative to the shaft tube 12  
21 through 180 degrees, so that the front wheel 80 is moved with the holding arm

1 14 and is turned to the outer side of the front fork 10 as shown in FIGS. 11 and  
2 12. Thus, the space under the head tube 20 is empty.

3 Finally, the support tube 30 is pivoted downward about the pivot pin  
4 33 to move from the position as shown in FIG. 11 to the position as shown in  
5 FIG. 13, so that the rear fork 60 is juxtaposed to the front fork 10 as shown in  
6 FIG. 13, and the rear wheel 90 is stored in the space under the head tube 20  
7 shown in FIG. 12. Thus, the foldable bicycle is folded.

8 At this time, the rear wheel 90 is juxtaposed to the holding arm 14  
9 and in parallel with the front wheel 80 shown in FIG. 12 while the two support  
10 levers 50 and the rear fork 60 are located between the front fork 10 and the  
11 support tube 30 as shown in FIG. 13.

12 Alternatively, when the foldable bicycle is expanded, the hydraulic  
13 cylinder 70 applies a restoring force to push and expand the support tube 30,  
14 the two support levers 50 and the rear fork 60, thereby facilitating expansion of  
15 the foldable bicycle.

16 Accordingly, when the foldable bicycle is folded, the rear wheel 90 is  
17 in parallel with the front wheel 80, so that the user can simultaneously draw the  
18 rear wheel 90 and the front wheel 80 to move easily and conveniently, thereby  
19 facilitating the user moving the folded bicycle. In addition, the foldable bicycle  
20 can folded easily and conveniently, thereby facilitating the user folding the  
21 bicycle.

1           Although the invention has been explained in relation to its preferred  
2   embodiment(s) as mentioned above, it is to be understood that many other  
3   possible modifications and variations can be made without departing from the  
4   scope of the present invention. It is, therefore, contemplated that the appended  
5   claim or claims will cover such modifications and variations that fall within the  
6   true scope of the invention.

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